Bones, nerves and muscles - what is the type of lesion and what can we do?

Nuss, Karl

Bones, nerves and muscles – what kind of lesion is it and what can we do?

Karl Nuss, Prof. Dr. med. vet., Diplomate ECVS, Farm Animal Department, University of Zürich, Winterthurerstrasse 260, CH-8057 Zürich, Switzerland

Bone

Sequestrum formation: A sequestrum is a necrotic piece of bone surrounded by purulent material that occurs after a deep wound, usually over the metacarpal or metatarsal bone with loss of part of the periosteum. Blunt trauma and rarely thromboembolism are other causes. A cavity with a characteristic fistulous tract, named cloaca, forms after infection. Granulation and periosteal reaction from adjacent regions form a covering layer referred to as an involucrum around the piece of necrotic bone. The sequestrum can only be seen on radiographs, starting approximately 2 to 3 weeks after injury. The metacarpal or metatarsal bones are commonly affected, whereas the radius, tibia and phalanges are rarely involved. Complete resorption of a small sequestrum is possible. However, it is preferred to surgically remove the sequestrum under local or general anesthesia. A support bandage is adequate after the removal of a small sequestrum. A splint bandage is required after removal of a large sequestrum in the metacarpal or metatarsal bone, and a transfixation cast is needed after excision of tibial sequestra to prevent fracture of the bone postoperatively.

Infection of the epiphyseal plates: The epiphyseal plate of the metacarpus/metatarsus (Fig. 1), the radial and tibial physis, and rarely of the phalanges, humerus and vertebrae, may become infected hematogenously. Overload of the epiphyseal plate may be caused by rapid growth in association with high-energy feeds, deficiency of copper, zinc or calcium, hard stall flooring, forced activity or mounting. Microfractures and disturbances in blood flow lead to necrosis and infection. Young cattle, six to 15 months of age, are particularly vulnerable. Swelling of the epiphyseal plate proximal to the joint pouches, severe lameness and pain on palpation are clinical signs. Radiographs show the formation of a 'lip' at the margin of the epiphyseal plate, radiolucency in the epiphyseal plate region or severe osteolysis (Fig. 1). Treatment of infection may be tried initially with antibiotics (intravenous or intraosseous regional anaesthesia) but usually requires surgical excision in case of bone lysis. This involves curettage of the affected metaphysis, and in advanced cases it may even be necessary to drill out the entire epiphyseal plate.[1,2] After surgery, a transfixation cast is applied. Malformations of the operated limb later in life are possible after partial resection and likely after total resection of an epiphyseal plate.

Fractures: Although metacarpal and metatarsal fractures can be treated successfully with fiber glass casts, some form of additional support is often needed in cattle. Beside a full limb resin cast, Thomas splints [3], external fixators and transfixation casting are used [4-7]. In adult cattle, treatment of long bone fractures is usually not undertaken because of the heavy weight of the animals and the costs associated with treatment.
The treatment of long bone fractures in calves remains difficult because of a high incidence of complications [8]. These are most likely attributable to trauma during delivery, which results in insufficient colostrum intake and predisposes to concurrent diseases. In addition, the characteristics of juvenile bone do not provide sufficient physical strength for implants. Therefore, professional and diligent assistance during forced extraction,

particularly in presentations with “stifle lock” or “hip lock”, is required to minimize the incidence of long bone fractures in newborn calves. Although healing of radial and ulnar fractures and sometimes even humeral, femoral or tibial fractures can be achieved with conservative treatment, most long bone fractures in newborn calves require surgical fixation, which is time consuming, expensive and carries a guarded prognosis.
In adult cattle, the weight and the need for general anaesthesia as well as the expensive surgical equipment limit the use of internal fixation.

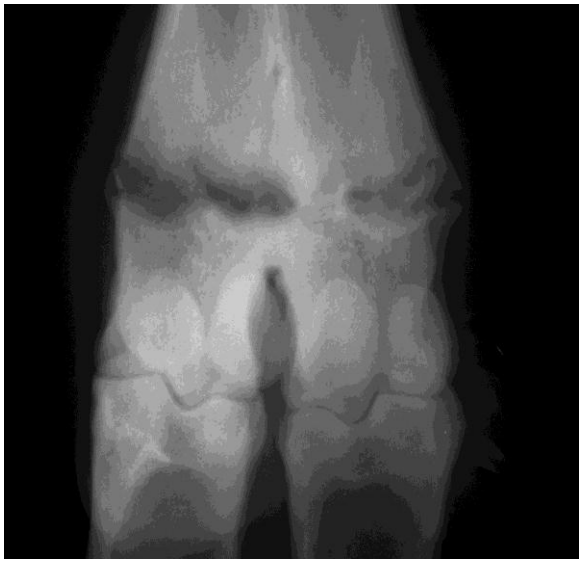

Figure 1: Physeal infection, metatarsal bone, heifer

Nerve lesions

Nerve lesions occur mainly in calves and cows during the calving period. This is due to trauma during delivery which can cause femoral nerve paralysis or even vertebral luxations or fractures in calves. In cows, nerve lesions either are caused by prolonged recumbency (“downer cows”), especially radial and fibular nerve paralysis. Or, they are most probably caused by forced extraction, like tibial, ischiadicus and obturator nerve paresis. In cattle of all ages, nerve damage is often caused by iatrogenic injection into tissues around nerves or into the nerves themselves.

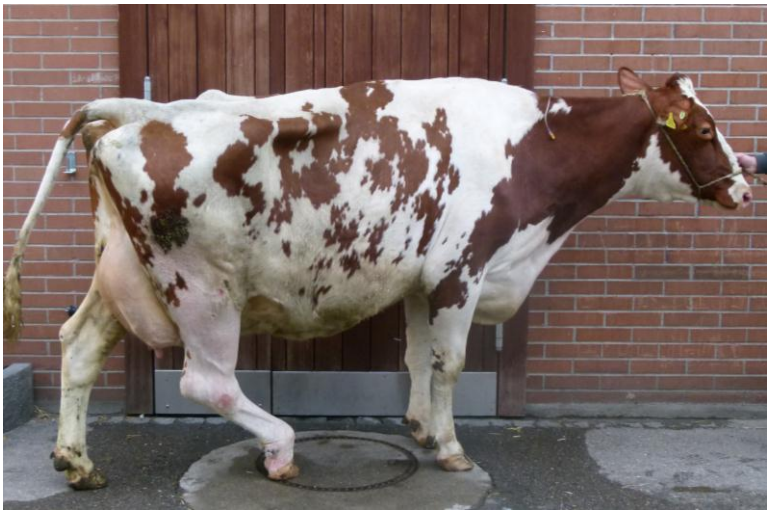

Fig. 2. Cow, 5, years. Tibial nerve paresis of 3 weeks duration

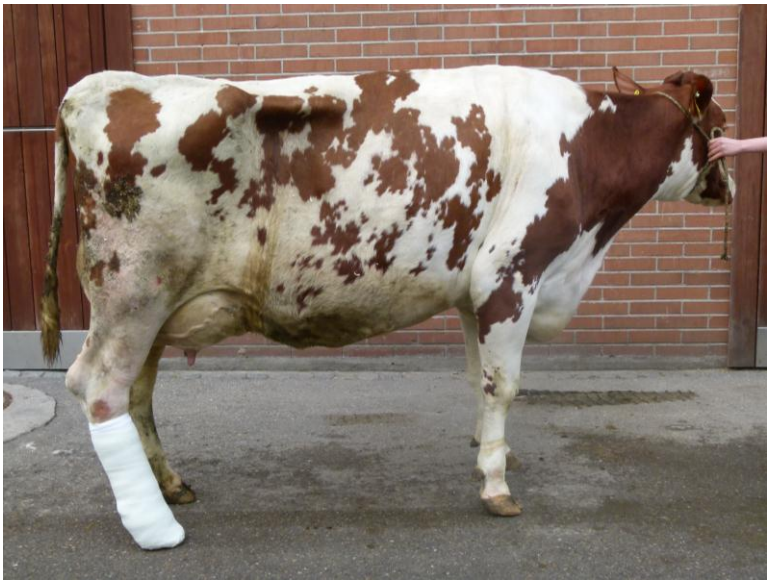

Fig. 2. Cow, 5, years. Tibial nerve paresis immediately after short limb cast [9] application

The main goal of treatment is to re-establish limb function to allow for healing of the nerve fibers and to prevent further damage to the muscles. This is accomplished by the means of splint bandages or fiber glass casts, wherever possible (Fig. 3). Supportive treatment consists of NSAIDs, Vit. B., i.v. fluids, soft bedding, housing in a small box, local massage and others. Partial loss of function (paresis) has a better prognosis than complete loss of function (paralysis). Prognosis depends on a great deal on the time and care the owner can provide for the animal.

Muscle problems

Two antagonist muscles in the hind limbs are the most important muscles that can be affected by traumatic diseases in cattle. The one is the gastrocnemius muscle, and the other the fibularis tertius muscle, which both form the reciprocal apparatus at the tarsus and stifle. In fibrillary rupture of the gastrocnemius, therapy is possible with a splint bandage, depending on the weight of the animals. In rupture of the fibularis tertius muscle, treatment consists of stall rest for 6 – 8 weeks. Prognosis is favorable when the body of the muscle is involved, and guarded when the tendon affected at its origin or its insertion in the bone.

References

1. De Kesel A, Verschooten F, De Moor A, et al: Bacterial osteitis-osteomyelitis of the growth plates in cattle. Vlaams Diergeneeskundig Tijdschrift 51:397-422, 1982.
2. Nuss K, Steiner A: Untersuchung des Bewegungsapparates bei Erkrankungen im Zehenbereich, in Fiedler A, Maierl J, Nuss K (eds): Erkrankungen der Klauen und Zehen des Rindes, Vol. Stuttgart, Schattauer, 2004, pp 63-76.
3. Gangl M, Grulke S, Serteyn D, et al: Retrospective study of 99 cases of bone fractures in cattle treated by external coaptation or confinement. Vet Rec 158:264-268, 2006.
4. Martens A, Steenhaut M, Gasthuys F, et al: Conservative and surgical treatment of tibial fractures in cattle. Vet Rec 143:12-16, 1998.
5. Tulleners EP: Metacarpal and metatarsal fractures in cattle. Vet Clin North Am Food Anim Pract 12:199-209, 1996.

6. St-Jean G: Advances in ruminant orthopedics. Veterinary Clinics of North America, Food Animal Practice 12:1-303, 1996.
7. Kostlin RG, Nuss K, Elma E: [Metacarpal and metatarsal fractures in cattle. Treatment and results]. Tierarztl Prax 18:131-144, 1990.
8. Nichols S, Anderson DE, Miesner MD, et al: Femoral diaphysis fractures in cattle: 26 cases (1994-2005). Aust Vet J 88:39-44, 2010.
9. Garz B: Nervus-tibialis-Parese bei acht Milchkühen – symptomatische Therapie mithilfe eines Kunstharzverbands. Tieraerztliche Praxis in press, 2011.